AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-58. (Canceled)

59. (New) A method of making an engineered blood vessel comprising an endothelial intimal layer surrounded by a smooth muscle medial layer, said method comprising contacting one or more factors with a matrix that is combined with endothelial cells and smooth muscle cells, wherein neither said endothelial cells combined with said matrix nor said smooth muscle cells combined with said matrix is exposed to said factors prior to combining both said endothelial cells and said smooth muscle cells with said matrix, said matrix that is combined with said endothelial cells and smooth muscle cells being circumferentially positioned around a tubular support, said factors being contained inside of said tubular support, wherein said support allows said one or more factors to move from the inside of said tubular support to said endothelial cells and smooth muscle cells in combination with said matrix, wherein said contacting results in the formation of said endothelial intimal layer surrounded by said smooth muscle medial layer, and wherein said one or more factors comprises:

i) one or more mitogenic factors and one or more attractant factors; and/or

ii) one or more mitoattractant factors.

60. (New) The method of claim 59, wherein the endothelial cells are derived from stem cells.

61. (New) The method of claim 60, wherein the stem cells are selected from the group consisting of embryonic stem cells, embryonic germ cells, non-embryonic cells that can form progeny of at least two germ layers, hematopoietic stem cells, mesenchymal stem cells, and endothelial progenitor cells.

62. (New) The method of claim 59, wherein the smooth muscle cells are derived from stem cells.

63. (New) The method of claim 62, wherein the stem cells are selected from the group consisting of embryonic stem cells, embryonic germ cells, non-embryonic cells that can form progeny of at least two germ layers, mesenchymal stem cells, and smooth muscle progenitor cells.

64. (New) The method of claim 60, wherein the stem cells are derived from bone marrow, brain, spinal cord, umbilical cord blood, liver, muscle, fat or placenta.

65. (New) The method of claim 59, wherein the matrix is comprised of a substance selected from the group consisting of fibrin, collagen, amphiphilic di-block copolymers, amphiphilic tri-block copolymers, and peptides.

66. (New) The method of claim 59, wherein the support comprises porous plastic.

67. (New) The method of claim 59, wherein the one or more mitoattractant factors is vascular endothelial growth factor.

68. (New) A composition in vitro, comprising a matrix in combination with endothelial cells and smooth muscle cells, said matrix in combination with said endothelial cells and smooth muscle cells being circumferentially positioned around a tubular support, the area inside said tubular support containing one or more factors, wherein said tubular support allows said one or more factors to move from the inside of said tubular support to said endothelial cells and smooth muscle cells in combination with said matrix, wherein neither said endothelial cells in combination with said matrix nor said smooth muscle cells in combination with said matrix are exposed to said factors prior to combining both said endothelial cells and said smooth muscle cells with said matrix, and wherein said one or more factors comprises:

i) one or more mitogenic factors and one or more attractant factors; and/or

ii) one or more mitoattractant factors.

69. (New) The composition of claim 68, wherein the endothelial cells are derived from stem cells.

70. (New) The composition of claim 69, wherein the stem cells are selected from the group consisting of embryonic stem cells, embryonic germ cells, non-embryonic cells that can form progeny of at least two germ layers, hematopoietic stem cells, mesenchymal stem cells, and endothelial progenitor cells.

71. (New) The composition of claim 68, wherein the smooth muscle cells are derived from stem cells.

72. (New) The composition of claim 68, wherein the stem cells are selected from the group consisting of embryonic stem cells, embryonic germ cells, non-embryonic cells that can form progeny of at least two germ layers, mesenchymal stem cells, and smooth muscle progenitor cells.

73. (New) The composition of claim 69, wherein the stem cells are derived from bone marrow, brain, spinal cord, umbilical cord blood, liver, muscle, fat or placenta.

74. (New) The composition of claim 68, wherein the matrix is comprised of a substance selected from the group consisting of fibrin, collagen, amphiphilic di-block copolymers, amphiphilic tri-block copolymers, and peptides.

75. (New) The composition of claim 68, wherein the one or more mitoattractant factors is vascular endothelial growth factor.

76. (New) An in vitro composition, comprising endothelial cells and smooth muscle cells in combination with a matrix, said matrix in combination with said endothelial cells and smooth muscle cells being circumferentially positioned around a tubular support, wherein neither said endothelial cells in combination with said matrix nor said smooth muscle cells in combination with said matrix are exposed to said factors prior to combining both said endothelial cells and said smooth muscle cells with said matrix, wherein one or more factors capable of permeating the support are present within the support, and wherein said factors are comprised of:

i) one or more mitogenic factors and one or more attractant factors; and/or

ii) one or more mitoattractant factors.

77. (New) A method of culturing cells in a matrix, comprising the steps of:

a) combining endothelial cells and smooth muscle cells with a matrix, wherein neither said endothelial cells nor said smooth muscle cells are cultured with said matrix prior to combining said endothelial cells and said smooth muscle cells with said matrix;

b) growing said combination of endothelial cells, smooth muscle cells, and matrix on the exterior surface of a tubular support, wherein said tubular support allows movement of one or more factors within said tubular support to said combination of endothelial cells, smooth muscle cells, and matrix; and

c) allowing movement of said one or more factors within said tubular support to said combined endothelial cells and smooth muscle cells in said matrix, wherein said one or more factors are comprised of:

i) one or more mitogenic factors and one or more attractant factors; and/or

ii) one or more mitoattractant factors.